Application No: 10/734,241
Inventor(s): Lee et al

Patent Application
NC 95,996

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-14 (canceled)

Claim 15 (withdrawn) A sensor for independently detecting a plurality of analytes in a test solution, comprising:

a test vessel;

a semipermeable membrane with pores for retaining the analyte, dividing said test vessel into a first volume and a second volume, wherein the surface of said membrane is chemically modified by attachment of at least two distinct membrane surface modifiers on at least a side facing said first volume, wherein said at least two distinct membrane surface modifiers are patterned into an array of distinct regions on said membrane surface;

at least two distinct groups of immunoassay labels disposed within said first volume, wherein each of said groups of immunoassay labels has distinct label binding ligands where these label binding ligands will have a binding affinity for one of said distinct membrane surface modifiers in the presence of the analyte, and a measurably different binding affinity for said one of said distinct membrane surface modifiers in the absence of the analyte;

a pressure source, for driving said test solution from said first volume into said second volume; and

a label detecting system, for detecting the presence or absence of said labels in each of said regions on said membrane.

Claim 16 (currently amended) A method for detecting a selected analyte in test solution, comprising:

providing a semipermeable membrane having pores for retaining the analyte, wherein said pores are selected to prevent the analyte from passing into or through said membrane, wherein said membrane is chemically modified by attachment of membrane surface modifiers to a surface of the membrane, said surface modifiers having a specific binding affinity to the analyte;

flowing said test solution to and through said modified surface of said membrane ~~a semipermeable having pores for retaining the analyte, wherein the surface of said membrane is chemically modified by attachment of membrane modifiers,~~ so that said analyte ~~contacts~~ is retained on said modified surface and said analyte binds to said membrane surface modifiers;

~~contacting said membrane with~~ labeling said bound analyte with immunoassay labels~~,~~ ~~said immunoassay labels having~~ modified by attachment of label binding ligands, said label binding ligands having~~, where these label binding ligands have~~ a binding affinity for the ~~membrane surface modifiers to in the presence of the~~ bound analyte, and a measurably different binding affinity for said membrane surface modifiers not bound to~~in the absence of~~ the analyte; ~~and~~

removing labels not bound to said analyte; and

detecting the presence or absence of said ~~labels~~ analyte by detecting the presence or

absence of said labels bound to said analyte ~~on said membrane~~.

Claims 17-25 (canceled)

Claim 26 (withdrawn) A sensor for independently detecting a plurality of analytes in a test solution, comprising:

a test vessel;

a semipermeable membrane with pores for retaining the analyte, dividing said test vessel into a first volume and a second volume, said pores are selected to prevent the analyte from passing into or through said semipermeable membrane;

wherein said membrane is chemically modified by attachment of at least two distinct membrane modifiers on at least a side facing said first volume but not within said pores;

wherein said at least two distinct membrane modifiers are patterned into an array of distinct regions on said membrane;

at least two distinct groups of assay labels disposed within said first volume, wherein each of said groups of assay labels has distinct label modifiers, said label modifiers having a binding affinity for one of said distinct membrane modifiers in the presence of the analyte, and a measurably different binding affinity for said one of said distinct membrane modifiers in the absence of the analyte;

a pressure source, for driving said test solution from said first volume into said second volume; and

a label detecting system, for detecting the presence or absence of said labels in each of

said regions on said membrane.

Claim 27 (withdrawn) The sensor of claim 26, wherein said membrane supports a 100 kPa pressure load and said membrane is functionalized with a binder at the surface of said membrane in order for said membrane to act as a sensor.

Claim 28 (withdrawn) The sensor of claim 26, wherein said membrane has pores not greater than 10 nm in diameter.

Claim 29 (withdrawn) The sensor of claim 26, wherein said membrane has a pore density of at least $10^{15}/m^2$.

Claim 30 (withdrawn) The sensor of claim 26, wherein said membrane is essentially flat and optically translucent when wet.

Claim 31 (withdrawn) The sensor of claim 30, wherein said membrane remains translucent, and the shape of said membrane remains flat even under pressure associated with flow of solution through said membrane.

Claim 32 (withdrawn) The sensor of claim 26, wherein said membrane is an aluminum oxide membrane.

Claim 33 (withdrawn) The sensor of claim 26, wherein an active surface of said membrane is modified with a biotin-polyethylene-glycol (PEG) using a polyethyleneimine (PEI) layer.

Claim 34 (withdrawn) The sensor of claim 26, wherein said pores allow a solvent to pass through while preventing flow of said binder, analyte, or assay labels.

Claim 35 (withdrawn) The sensor of claim 26, wherein said membrane has pores not greater than 20 nm in diameter.

Claim 36 (cancelled) A method for detecting a selected analyte in test solution, comprising:

flowing said test solution through a semipermeable membrane, said pores are selected to prevent the analyte from passing into or through said semipermeable membrane, wherein said membrane is chemically modified by attachment of membrane modifiers on at least a side facing said first volume but not within said pores, so that said analyte contacts said membrane modifiers;

contacting said membrane with assay labels, said assay labels having label modifiers, wherein these label modifiers have a binding affinity for the membrane modifiers in the presence of the analyte, and a measurably different binding affinity for said membrane modifiers in the absence of the analyte; and

detecting the presence or absence of said labels on said membrane.

Claim 37 (currently amended) The method of claim ~~36~~16, wherein said membrane has pores not greater than 10 nm in diameter.

Claim 38 (currently amended) The method of claim ~~36~~16, wherein said membrane supports a 100 kPa pressure load ~~and said membrane is functionalized with a binder at the surface of said membrane in order for said membrane to act as a sensor~~.

Claim 39 (currently amended) The method of claim ~~36~~16, wherein said membrane has a pore density of at least $10^{15}/m^2$.

Claim 40 (currently amended) The method of claim ~~36~~16, wherein said membrane is essentially flat and optically translucent when wet.

Claim 41 (original) The method of claim 40, wherein said membrane remains translucent, and the shape of said membrane remains flat even under pressure associated with flow of solution through said membrane.

Claim 42 (currently amended) The method of claim ~~36~~16, wherein said membrane is an aluminum oxide membrane.

Claim 43 (currently amended) The method of claim ~~36~~16, wherein ~~an active surface of~~ said modified side of said membrane is modified with a biotin-polyethylene-glycol (PEG) using a polyethyleneimine (PEI) layer.

Claim 44 (currently amended) The method of claim ~~36~~16, wherein said pores allow a solvent to pass through while preventing flow of said binder, analyte, or assay labels.

Claim 45 (currently amended) The ~~sensor~~ method of claim ~~36~~16, wherein said membrane has pores not greater than 20 nm in diameter.